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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/609,069

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K. Scott Weil

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7590 08/17/2010  
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EXAMINER

ECHELMMEYER, ALIX ELIZABETH

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/609,069	<b>Applicant(s)</b> WEIL ET AL.	
	<b>Examiner</b> Alix Elizabeth Echelmeyer	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 August 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                    | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response***

1. This Office Action is in response to the arguments filed August 12, 2010. Claims 1-21 are pending and are rejected finally for the reasons given below.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3, 8-15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haltiner et al. (US 2003/0235746) in view of Pondo (US 6,017,649) and Thomas et al. (2005/0074659).

Haltiner et al. teach a solid oxide fuel cell (SOFC) having sheet metal parts stamped from flat stock (abstract, [0009], [0010]). The parts, including a mounting frame for a positive electrode – electrolyte – negative electrode (PEN) and a separator plate, are used to form modules, or cells (abstract, [0009]). Those modules can then be stacked to form a fuel cell stack (Fig. 7, [0032]). Haltiner et al. also teach the use of current collectors which may be connected across a load (Fig. 3, [0003], [0025]). Glass seals are used between the modules. A glass layer or ceramic adhesive is applied prior to assembly, then the stack is “subjected to high pressure and temperature, whereby the glass seals are liquefied and fused” ([0032]). Since this is the same as the claimed

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method, the examiner finds that the seals are inherently hermetic as required by claim 1.

Regarding claim 1, the SOFC modules of Haltiner et al. contain a stamped separator plate, a stamped frame, a PEN attached to the frame, and the frame attached to the separator plate. Regarding claims 3 and 17, the SOFC of Haltiner et al. contains current collectors that are in communication with the separator plate. Applicants' claim 8 is for a method of making a SOFC stack, and claim 13 is a SOFC stack. Haltiner et al. teach the combination of several modules to form a stack as well as the sealing of the modules.

Applicants' claims 9-12, 14, and 15 are drawn to the method of sealing a SOFC stack and the seal on the SOFC stack. Haltiner et al. teach insulating seals made of glass or a ceramic. The seal is formed by exposure to high temperature and pressure. Further, Haltiner et al. teach the connection of separator plates and frames by brazing.

With further regard to claims 1 and 13, Haltiner et al. fails to teach the stamped separator plate and frame with displaced outer edges. Instead, Haltiner et al. teach a composite, with the cathode spacer and separator being analogous to the stamped separator plate, and the anode spacer analogous to the frame, but lacking the downwardly displaced outer edge (see Figure 4 of Haltiner et al.).

Pondo teaches multiple step manifolds for the fuel and oxidant streams (column 2 line 66 - column 3 line 9). A fuel cell assembly is seen in Figure 3B of Pondo. Pondo teaches that the upward and downward bends of the plates make for a better seal in the

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manifolds as well as better integrity of the plates, and the resultant fuel cell can tolerate greater stack pressures (column 3 lines 1-6). Pondo further teaches that the bent pieces may be made by stamping sheet metal (column 6 lines 51-57).

It would be advantageous to make the separator plate of Haltiner et al., with the cathode spacer, into one piece such as seen in the separator plate of Haltiner et al. (as seen in Figure 3B, for example), with an upward bend at the manifold, since such a configuration would make a better seal and increase the strength and integrity of the fuel cell. Further, such a bent configuration would be advantageous to use with the anode spacer of Haltiner et al., such as seen in the bottom separator of Pondo (Figure 3B), since it would provide a better seal since it would meet with the bent part of the separator in the cell below, through which the fuel would have to pass.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the cathode spacer and separator of Haltiner et al. into a single piece that is bent upwardly, such as in Pondo, and to make the anode spacer, or frame, into a piece that is bent downwardly so as to form a seal with the adjacent separator of the cell below.

As for the limitation in claims 1 and 13 requiring a support bump in the frame or separator plate, Haltiner et al. in view of Pondo fail to teach a support bump.

Thomas et al. teach gas flow control formations, or support bumps, that serve as spacers to control the spacing of the separator plate in the fuel cell ([0021]).

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It would be desirable to use gas flow control formations, or support bumps, on the separator of Haltiner et al. such as taught by Thomas et al., since such support bumps would ensure proper spacing in the cell, which might allow for gas to flow in the absence of a gas diffusion layer, or would ensure that the proper amount of gas could be made available since there would be sufficient space for the gas due to the spacers.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use gas flow control formations, or support bumps, on the separator of Haltiner et al. such as taught by Thomas et al., since such support bumps would ensure proper spacing in the cell, which might allow for gas to flow in the absence of a gas diffusion layer, or would ensure that the proper amount of gas could be made available since there would be sufficient space for the gas due to the spacers.

4. Claims 2 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haltiner et al. in view of Pondo as applied to claims 1 and 13, above and in further view of Carolan et al. (US Patent Number 5,750,279).

The teachings of Haltiner et al. and Pondo as discussed above are incorporated herein.

Haltiner et al. in view of Pondo teach a fuel cell stack and the method of making it wherein the stack is made up of modules. The modules are formed by frames containing a PEN, which are connected to separator plates. Haltiner et al. fails to teach the use of 400 series stainless steel as the material for the frames and separators.

Carolán et al. teach that stainless steel (400 series) is suitable for use in SOFC's because it is resistant to corrosion and oxidation.

It would be favorable to use 400 series stainless steel as taught by Carolán et al. in the SOFC of Haltiner et al. in view of Pondo because 400 series stainless steel can be stamped as required in Haltiner et al. in view of Pondo, and it is also resistant to corrosion and oxidation.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the 400 series stainless steel of Carolán et al. in the SOFC of Haltiner et al. and Pondo because 400 series stainless steel is resistant to corrosion and oxidation.

5. Claims 4-7 and 18-21 rejected under 35 U.S.C. 103(a) as being unpatentable over Haltiner et al. in view of Pondo as applied to claims 3 and 17 above, and in further view of James et al. (US Patent Number 5,766,789 A).

The teachings of Haltiner et al. and Pondo discussed above are incorporated herein.

Haltiner et al. in view of Pondo teach the use of an electrically conducting interconnect. Haltiner et al. in view of Pondo fail to teach the use of a flexible material such as a screen for those interconnects.

James et al. teach the use of a screen as a flexible material for an interconnect (column 3 lines 24-26). James et al further teach a compound containing mostly (76%) nickel for the formation of the screen used as the current collector in the anode.

By forming the current collector of Haltiner et al. in view of Pondo with the screen of James et al., a current collector made from a flexible, electrically conductive material is made.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to make the current collector of Haltiner et al. in view of Pondo with the screen of James et al. in order to make a flexible, electrically conductive current collector.

### ***Response to Arguments***

6. Applicant's arguments filed August 12, 2010 have been fully considered but they are not persuasive.

Applicant begins, on page 2, by arguing that Haltiner et al. teach away from the stamped separator plate of the instant invention and Pondo. The examiner strongly disagrees. Haltiner et al. teach that stamping *is not required*, which the skilled artisan will recognize as a teaching of stamping itself - the teachings clearly shows that stamping of separator plates was known in the art at the time of Haltiner et al.

Next, on page 4, Applicant states that he did not make the argument that Pondo fails to teach PEN cells. Applicant is directed to the second to last line of page 6 of the Response filed November 9, 2009, where it is argued, "Pondo is not using PEN cells in Pondo's stack." The examiner is confused as to Applicant's assertion in the response of August 12, 2010 that this point was not argued.



Beginning on page 5, Applicant argues that Pondo does not teach several limitations from the instant claims, including attaching the frame to the separator plate, using a frame, welding, or a hermetic seal. The examiner notes that these limitations, except for the welding limitation, are taught by Haltiner et al. The welding limitation that Applicant argues (see second full paragraph of page 6) is not found in the claims.

Furthermore, the Pondo reference is drawn only to a separator plate (see abstract), so Applicant's argument that Pondo does not teach other parts of a fuel cell system is not convincing since it is not relied upon in the rejection above for such teachings.

As to Applicant's arguments concerning the other cited references, these arguments are not convincing since the examiner finds that the limitations that Applicant argues are taught in the combination of Haltiner et al. in view of Pondo.

### ***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is (571)272-1101. The examiner can normally be reached on Mon-Fri 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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